



SEQUENCE LISTING

<110> De Buyt, Eric
Lahaye, Andree
Ledoux, Pierre
Detroz, Rene

<120> Xylanase, Microorganisms Producing it,
DNA Molecules, Methods for Preparing this Xylanase and Uses
of the Latter

<130> GC450-D1-US

<140> US 09/909,207

<141> 2001-07-19

<150> US 08/470,953

<151> 1995-06-06

<150> BE 09500448

<151> 1995-05-17

<150> BE 09400706

<151> 1994-07-26

<160> 29

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<211> 663

<212> DNA

<213> Bacillus sp.

<400> 1

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aacaatgtta	acaacatatt	attccgtaaa	ggtaaaaaat	tcaatgaaac	acaaacacac	180
caacaagttg	gtaacatgtc	cataaactac	ggagccaact	tccaaccaa	tggtaatg	240
tatttatg	tctatggtt	gactgttgac	cctctgtcg	aatattatat	tgctgacagt	300
tggggcaact	ggcgtccacc	aggagcaacg	cctaagggga	ccatcactgt	tgatggagga	360
acatatgata	tctacgagac	tcttagagtc	aatcaaccct	ccattaaggg	gattgccaca	420
tttaacaat	attggagtgt	tcgaagatcg	aaacgcacga	gtggcacgat	ttctgtcagc	480
aaccacttta	gagcgtggga	aaacttaggg	atgaatatgg	ggaaaatgta	tgaagtcg	540
cttactgtag	aaggctatca	aagtagcgga	agtgctaata	tatatagcaa	tacactaaga	600
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aat						663

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<211> 663

<212> DNA

<213> Bacillus sp.

<220>

<221> CDS

<222> (1)...(663)

<221> mat_peptide

<222> (1)...(663)

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gaa ttt tgg aaa gat agc ggt ggc tct ggg aca atg att ctc aat cat	96
Glu Phe Trp Lys Asp Ser Gly Gly Ser Gly Thr Met Ile Leu Asn His	
20 25 30	
ggc ggt acg ttc agt gcc caa tgg aac aat gtt aac aac ata tta ttc	144
Gly Gly Thr Phe Ser Ala Gln Trp Asn Asn Val Asn Asn Ile Leu Phe	
35 40 45	
cgt aaa ggt aaa aaa ttc aat gaa aca caa aca cac caa caa gtt ggt	192
Arg Lys Gly Lys Lys Phe Asn Glu Thr Gln Thr His Gln Gln Val Gly	
50 55 60	
aac atg tcc ata aac tac gga gcc aac ttc caa cca aat ggt aat gcg	240
Asn Met Ser Ile Asn Tyr Gly Ala Asn Phe Gln Pro Asn Gly Asn Ala	
65 70 75 80	
tat tta tgc gtc tat ggt tgg act gtt gac cct ctt gtc gaa tat tat	288
Tyr Leu Cys Val Tyr Gly Trp Thr Val Asp Pro Leu Val Glu Tyr Tyr	
85 90 95	
att gtc gac agt tgg ggc aac tgg cgt cca cca gga gca acg cct aag	336
Ile Val Asp Ser Trp Gly Asn Trp Arg Pro Pro Gly Ala Thr Pro Lys	
100 105 110	
ggg acc atc act gtt gat gga gga aca tat gat atc tac gag act ctt	384
Gly Thr Ile Thr Val Asp Gly Gly Thr Tyr Asp Ile Tyr Glu Thr Leu	
115 120 125	
aga gtc aat caa ccc tcc att aag ggg att gcc aca ttt aaa caa tat	432
Arg Val Asn Gln Pro Ser Ile Lys Gly Ile Ala Thr Phe Lys Gln Tyr	
130 135 140	
tgg agt gtt cga aga tcg aaa cgc acg agt ggc acg att tct gtc agc	480
Trp Ser Val Arg Arg Ser Lys Arg Thr Ser Gly Thr Ile Ser Val Ser	
145 150 155 160	
aac cac ttt aga gcg tgg gaa aac tta ggg atg aat atg ggg aaa atg	528
Asn His Phe Arg Ala Trp Glu Asn Leu Gly Met Asn Met Gly Lys Met	
165 170 175	
tat gaa gtc gcg ctt act gta gaa ggc tat caa agt agc gga agt gct	576
Tyr Glu Val Ala Leu Thr Val Glu Gly Tyr Gln Ser Ser Gly Ser Ala	
180 185 190	
aat gta tat agc aat aca cta aga att aac ggt aac cct ctc tca act	624
Asn Val Tyr Ser Asn Thr Leu Arg Ile Asn Gly Asn Pro Leu Ser Thr	
195 200 205	

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 Ile Ser Asn Asp Glu Ser Ile Thr Leu Asp Lys Asn Asn
 210 215 220

663

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 <211> 221
 <212> PRT
 <213> Bacillus sp.

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 20 25 30
 Gly Gly Thr Phe Ser Ala Gln Trp Asn Asn Val Asn Asn Ile Leu Phe
 35 40 45
 Arg Lys Gly Lys Lys Phe Asn Glu Thr Gln Thr His Gln Gln Val Gly
 50 55 60
 Asn Met Ser Ile Asn Tyr Gly Ala Asn Phe Gln Pro Asn Gly Asn Ala
 65 70 75 80
 Tyr Leu Cys Val Tyr Gly Trp Thr Val Asp Pro Leu Val Glu Tyr Tyr
 85 90 95
 Ile Val Asp Ser Trp Gly Asn Trp Arg Pro Pro Gly Ala Thr Pro Lys
 100 105 110
 Gly Thr Ile Thr Val Asp Gly Gly Thr Tyr Asp Ile Tyr Glu Thr Leu
 115 120 125
 Arg Val Asn Gln Pro Ser Ile Lys Gly Ile Ala Thr Phe Lys Gln Tyr
 130 135 140
 Trp Ser Val Arg Arg Ser Lys Arg Thr Ser Gly Thr Ile Ser Val Ser
 145 150 155 160
 Asn His Phe Arg Ala Trp Glu Asn Leu Gly Met Asn Met Gly Lys Met
 165 170 175
 Tyr Glu Val Ala Leu Thr Val Glu Gly Tyr Gln Ser Ser Gly Ser Ala
 180 185 190
 Asn Val Tyr Ser Asn Thr Leu Arg Ile Asn Gly Asn Pro Leu Ser Thr
 195 200 205
 Ile Ser Asn Asp Glu Ser Ile Thr Leu Asp Lys Asn Asn
 210 215 220

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 <213> Bacillus sp.

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 tatgattatg aatttttgaa agatagcggg ggctctggga caatgattct caatcatggc 180
 ggtacgttca gtgccaatg gaacaatgtt aacaacatat tattccgtaa aggtaaaaaa 240
 ttcaatgaaa cacaacaca ccaacaagtt ggtaacatgt ccataaacta cggagccaac 300
 ttccaaccaa atggtaatgc gtattttatgc gtctatgggt ggactgttga ccctcttgtc 360
 gaattattata ttgtcgacag ttgggggcaac tggcggtccac caggagcaac gcctaagggg 420
 accatcactg ttgatggagg aacatatgat atctacgaga ctcttagagt caatcaaccc 480
 tccattaagg ggattgccac atttaaaciaa tattggagtg ttcgaagatc gaaacgcacg 540
 agtggcacga tttctgtcag caaccacttt agagcgtggg aaaacttagg gatgaatatg 600
 gggaaaatgt atgaagtcgc gcttactgta gaaggctatc aaagtagcgg aagtgtctaat 660

gtatatagca atacactaag aattaacggg aaccctctct caactattag taatgacgag 720
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<210> 5
 <211> 744
 <212> DNA
 <213> Bacillus sp.

<220>
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 <222> (1)...(744)

<221> mat_peptide
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<221> sig_peptide
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 Met Arg Gln Lys Lys Leu Thr Leu Ile Leu Ala Phe Leu Val Cys Phe
 1 5 10 15

gca cta acc tta cct gca gaa ata att cag gca caa atc gtc acc gac 96
 Ala Leu Thr Leu Pro Ala Glu Ile Ile Gln Ala Gln Ile Val Thr Asp
 20 25 30

aat tcc att ggc aac cac gat ggc tat gat tat gaa ttt tgg aaa gat 144
 Asn Ser Ile Gly Asn His Asp Gly Tyr Asp Tyr Glu Phe Trp Lys Asp
 35 40 45

agc ggt ggc tct ggg aca atg att ctc aat cat ggc ggt acg ttc agt 192
 Ser Gly Gly Ser Gly Thr Met Ile Leu Asn His Gly Gly Thr Phe Ser
 50 55 60

gcc caa tgg aac aat gtt aac aac ata tta ttc cgt aaa ggt aaa aaa 240
 Ala Gln Trp Asn Asn Val Asn Asn Ile Leu Phe Arg Lys Gly Lys Lys
 65 70 75 80

ttc aat gaa aca caa aca cac caa caa gtt ggt aac atg tcc ata aac 288
 Phe Asn Glu Thr Gln Thr His Gln Gln Val Gly Asn Met Ser Ile Asn
 85 90 95

tac gga gcc aac ttc caa cca aat ggt aat gcg tat tta tgc gtc tat 336
 Tyr Gly Ala Asn Phe Gln Pro Asn Gly Asn Ala Tyr Leu Cys Val Tyr
 100 105 110

ggt tgg act gtt gac cct ctt gtc gaa tat tat att gtc gac agt tgg 384
 Gly Trp Thr Val Asp Pro Leu Val Glu Tyr Tyr Ile Val Asp Ser Trp
 115 120 125

ggc aac tgg cgt cca cca gga gca acg cct aag ggg acc atc act gtt 432
 Gly Asn Trp Arg Pro Pro Gly Ala Thr Pro Lys Gly Thr Ile Thr Val
 130 135 140

gat gga gga aca tat gat atc tac gag act ctt aga gtc aat caa ccc 480
 Asp Gly Gly Thr Tyr Asp Ile Tyr Glu Thr Leu Arg Val Asn Gln Pro

145		150		155		160	
tcc att aag ggg att gcc aca ttt aaa caa tat tgg agt gtt cga aga							528
Ser Ile Lys Gly Ile Ala Thr Phe Lys Gln Tyr Trp Ser Val Arg Arg							
	165			170		175	
tcg aaa cgc acg agt ggc acg att tct gtc agc aac cac ttt aga gcg							576
Ser Lys Arg Thr Ser Gly Thr Ile Ser Val Ser Asn His Phe Arg Ala							
	180			185		190	
tgg gaa aac tta ggg atg aat atg ggg aaa atg tat gaa gtc gcg ctt							624
Trp Glu Asn Leu Gly Met Asn Met Gly Lys Met Tyr Glu Val Ala Leu							
	195			200		205	
act gta gaa ggc tat caa agt agc gga agt gct aat gta tat agc aat							672
Thr Val Glu Gly Tyr Gln Ser Ser Gly Ser Ala Asn Val Tyr Ser Asn							
	210			215		220	
aca cta aga att aac ggt aac cct ctc tca act att agt aat gac gag							720
Thr Leu Arg Ile Asn Gly Asn Pro Leu Ser Thr Ile Ser Asn Asp Glu							
	225			230		235	240
agc ata act ttg gat aaa aac aat							744
Ser Ile Thr Leu Asp Lys Asn Asn							
	245						

<210> 6
 <211> 248
 <212> PRT
 <213> Bacillus sp.

<400> 6

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	20						25						30		
Asn Ser Ile Gly Asn His Asp Gly Tyr Asp Tyr Glu Phe Trp Lys Asp															
	35						40						45		
Ser Gly Gly Ser Gly Thr Met Ile Leu Asn His Gly Gly Thr Phe Ser															
	50					55					60				
Ala Gln Trp Asn Asn Val Asn Asn Ile Leu Phe Arg Lys Gly Lys Lys															
	65				70				75						80
Phe Asn Glu Thr Gln Thr His Gln Gln Val Gly Asn Met Ser Ile Asn															
		85						90						95	
Tyr Gly Ala Asn Phe Gln Pro Asn Gly Asn Ala Tyr Leu Cys Val Tyr															
	100						105						110		
Gly Trp Thr Val Asp Pro Leu Val Glu Tyr Tyr Ile Val Asp Ser Trp															
	115					120						125			
Gly Asn Trp Arg Pro Pro Gly Ala Thr Pro Lys Gly Thr Ile Thr Val															
	130				135						140				
Asp Gly Gly Thr Tyr Asp Ile Tyr Glu Thr Leu Arg Val Asn Gln Pro															
	145				150				155						160
Ser Ile Lys Gly Ile Ala Thr Phe Lys Gln Tyr Trp Ser Val Arg Arg															
		165					170							175	
Ser Lys Arg Thr Ser Gly Thr Ile Ser Val Ser Asn His Phe Arg Ala															
	180						185						190		

Trp	Glu	Asn	Leu	Gly	Met	Asn	Met	Gly	Lys	Met	Tyr	Glu	Val	Ala	Leu
		195					200					205			
Thr	Val	Glu	Gly	Tyr	Gln	Ser	Ser	Gly	Ser	Ala	Asn	Val	Tyr	Ser	Asn
	210					215					220				
Thr	Leu	Arg	Ile	Asn	Gly	Asn	Pro	Leu	Ser	Thr	Ile	Ser	Asn	Asp	Glu
225					230					235					240
Ser	Ile	Thr	Leu	Asp	Lys	Asn	Asn								
				245											

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 <211> 81
 <212> DNA
 <213> Bacillus sp.

<400> 7
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 <211> 81
 <212> DNA
 <213> Bacillus sp.

<220>
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 <222> (1)...(81)

<221> sig_peptide
 <222> (1)...(81)

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Met	Arg	Gln	Lys	Lys	Leu	Thr	Leu	Ile	Leu	Ala	Phe	Leu	Val	Cys	Phe	
1				5					10					15		
gca cta acc tta cct gca gaa ata att cag gca																81
Ala	Leu	Thr	Leu	Pro	Ala	Glu	Ile	Ile	Gln	Ala						
			20					25								

<210> 9
 <211> 27
 <212> PRT
 <213> Bacillus sp.

Met	Arg	Gln	Lys	Lys	Leu	Thr	Leu	Ile	Leu	Ala	Phe	Leu	Val	Cys	Phe
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Ala	Leu	Thr	Leu	Pro	Ala	Glu	Ile	Ile	Gln	Ala					
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<210> 10
 <211> 1513
 <212> DNA
 <213> Bacillus sp.

<400> 10

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ataggaactt	tcccatttgc	aagacgataa	aaaatctttt	tcccctat	tatcttatcg	180
ccttgatcgg	tttaatttgt	aaactttatt	ttagtttacg	tgatgttccc	tcattcatac	240
cattaatcac	agttaacgct	agagtcac	tttttcggtt	ctcaaaaata	cctgaagaac	300
atztatgtca	tattttctca	cgccgctcca	taatggaata	tatatactct	tttatacata	360
ttaagtaaat	tagtatatac	ttgcgttatc	aaaatgtgag	ataatcta	tgatcaaaca	420
agcagctatc	caaaaaacac	tgatgttgac	ctcttaaaga	agtgtcacta	tctatgaaaa	480
gataattatc	cagtttcaaa	atltgaaata	gtgtgtatgg	aatagtttga	atgtcaactg	540
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ttaaaaggag	gaatgcctaa	tgagacaaaa	gaaattgacg	ttgattttag	cctttttagt	660
ttgttttgca	ctaaccctac	ctgcagaaat	aattcaggca	caaatcgta	ccgacaattc	720
cattggcaac	cacgatggct	atgattatga	atlttgaaa	gatagcgggtg	gctctgggac	780
aatgattctc	aatcatggcg	gtacgttcag	tgcccaatgg	aacaatgtta	acaacatatt	840
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aagtagcggg	agtgtcaatg	tatatagcaa	tacactaaga	attaacggta	accctctctc	1320
aactattagt	aatgacgaga	gcataaactt	ggataaaaa	aattaaaaat	ccttatctct	1380
ttcggttcag	ttctcattat	tttcaaataa	cctcccggtt	ggatcttttc	caacgggagg	1440
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cctccgtcac	tag					1513

<210> 11
 <211> 1513
 <212> DNA
 <213> Bacillus sp.

<220>
 <221> CDS
 <222> (620)...(1363)

<221> mat_peptide
 <222> (701)...(1363)

<221> sig_peptide
 <222> (620)...(700)

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ataggaactt	tcccatttgc	aagacgataa	aaaatctttt	tcccctat	tatcttatcg	180
ccttgatcgg	tttaatttgt	aaactttatt	ttagtttacg	tgatgttccc	tcattcatac	240
cattaatcac	agttaacgct	agagtcac	tttttcggtt	ctcaaaaata	cctgaagaac	300
atztatgtca	tattttctca	cgccgctcca	taatggaata	tatatactct	tttatacata	360
ttaagtaaat	tagtatatac	ttgcgttatc	aaaatgtgag	ataatcta	tgatcaaaca	420
agcagctatc	caaaaaacac	tgatgttgac	ctcttaaaga	agtgtcacta	tctatgaaaa	480
gataattatc	cagtttcaaa	atltgaaata	gtgtgtatgg	aatagtttga	atgtcaactg	540
ctgtgaaagg	agggtaggta	gtaccgtaga	cttcattacc	aaaaattagt	tgtaaaaaaa	600
ttaaaaggag	gaatgcctaa	atg aga caa	aag aaa ttg	acg ttg att	tta gcc	652
		Met Arg Gln	Lys Lys Leu	Thr Leu Ile	Leu Ala	
		1	5		10	

ttt tta gtt tgt ttt gca cta acc tta cct gca gaa ata att cag gca Phe Leu Val Cys Phe Ala Leu Thr Leu Pro Ala Glu Ile Ile Gln Ala 15 20 25	700
caa atc gtc acc gac aat tcc att ggc aac cac gat ggc tat gat tat Gln Ile Val Thr Asp Asn Ser Ile Gly Asn His Asp Gly Tyr Asp Tyr 30 35 40	748
gaa ttt tgg aaa gat agc ggt ggc tct ggg aca atg att ctc aat cat Glu Phe Trp Lys Asp Ser Gly Gly Ser Gly Thr Met Ile Leu Asn His 45 50 55	796
ggc ggt acg ttc agt gcc caa tgg aac aat gtt aac aac ata tta ttc Gly Gly Thr Phe Ser Ala Gln Trp Asn Asn Val Asn Asn Ile Leu Phe 60 65 70 75	844
cgt aaa ggt aaa aaa ttc aat gaa aca caa aca cac caa caa gtt ggt Arg Lys Gly Lys Lys Phe Asn Glu Thr Gln Thr His Gln Gln Val Gly 80 85 90	892
aac atg tcc ata aac tac gga gcc aac ttc caa cca aat ggt aat gcg Asn Met Ser Ile Asn Tyr Gly Ala Asn Phe Gln Pro Asn Gly Asn Ala 95 100 105	940
tat tta tgc gtc tat ggt tgg act gtt gac cct ctt gtc gaa tat tat Tyr Leu Cys Val Tyr Gly Trp Thr Val Asp Pro Leu Val Glu Tyr Tyr 110 115 120	988
att gtc gac agt tgg ggc aac tgg cgt cca cca gga gca acg cct aag Ile Val Asp Ser Trp Gly Asn Trp Arg Pro Pro Gly Ala Thr Pro Lys 125 130 135	1036
ggg acc atc act gtt gat gga gga aca tat gat atc tac gag act ctt Gly Thr Ile Thr Val Asp Gly Gly Thr Tyr Asp Ile Tyr Glu Thr Leu 140 145 150 155	1084
aga gtc aat caa ccc tcc att aag ggg att gcc aca ttt aaa caa tat Arg Val Asn Gln Pro Ser Ile Lys Gly Ile Ala Thr Phe Lys Gln Tyr 160 165 170	1132
tgg agt gtt cga aga tcg aaa cgc acg agt ggc acg att tct gtc agc Trp Ser Val Arg Arg Ser Lys Arg Thr Ser Gly Thr Ile Ser Val Ser 175 180 185	1180
aac cac ttt aga gcg tgg gaa aac tta ggg atg aat atg ggg aaa atg Asn His Phe Arg Ala Trp Glu Asn Leu Gly Met Asn Met Gly Lys Met 190 195 200	1228
tat gaa gtc gcg ctt act gta gaa ggc tat caa agt agc gga agt gct Tyr Glu Val Ala Leu Thr Val Glu Gly Tyr Gln Ser Ser Gly Ser Ala 205 210 215	1276
aat gta tat agc aat aca cta aga att aac ggt aac cct ctc tca act Asn Val Tyr Ser Asn Thr Leu Arg Ile Asn Gly Asn Pro Leu Ser Thr 220 225 230 235	1324
att agt aat gac gag agc ata act ttg gat aaa aac aat taaaaatcct	1373

Ile Ser Asn Asp Glu Ser Ile Thr Leu Asp Lys Asn Asn
 240 245

tatctctttc gggttcagttc tcattatattt caaataacct cccggttgga tcttttccaa 1433
 cgaggaggttt tattggaaag gttaagtata gtatactccg attccatcca gaggaatgct 1493
 tgaaacacct ccgtcactag 1513

<210> 12
 <211> 619
 <212> DNA
 <213> Bacillus sp.

<400> 12
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 ataggaactt tcccatttgc aagacgataa aaaatctttt tcccctattt tatcttatcg 180
 ccttgatcgg tttaatttgt aaactttatt ttagtttacg tgatgttccc tcattcatac 240
 cattaatcac agttaacgct agagtcactt tttttcgggt ctcaaaaata cctgaagaac 300
 atttatgtca ttttttctca cgccgctcca taatggaata tatatactct tttatacata 360
 ttaagtaaatt tagtatatac ttgcgttatc aaaatgtgag ataacttaatt tgatcaaaca 420
 agcagctatc caaaaaacac tgatgttgac ctcttaaaga agtgtcacta tctatgaaaa 480
 gataattatc cagtttcaaa atttgaaata gtgtgtatgg aatagtttga atgtcaactg 540
 ctgtgaaagg agggtaggta gtaccgtaga cttcattacc aaaaattagt tgtaaaaaaa 600
 ttaaaaggag gaatgccta 619

<210> 13
 <211> 150
 <212> DNA
 <213> Bacillus sp.

<400> 13
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 gaggaatgct tgaaacacct ccgtcactag 150

<210> 14
 <211> 56
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> synthetic oligonucleotide

<400> 14
 cccccctacg tagcggccgc cccggccggt aacctaggaa gtcagcgccc tgcacc 56

<210> 15
 <211> 56
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> synthetic oligonucleotide

<400> 15
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<210> 16
 <211> 31
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> synthetic oligonucleotide

 <400> 16
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 <210> 17
 <211> 19
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> synthetic oligonucleotide

 <400> 17
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 <210> 18
 <211> 18
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> synthetic oligonucleotide

 <400> 18
 cggtcgccgc atacacta 18

 <210> 19
 <211> 36
 <212> DNA
 <213> Artificial Sequence

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ggaaa                                           185

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gtg ctg aca ctg acg gct gtg ccg gct cat gcg      81
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Val Leu Thr Leu Thr Ala Val Pro Ala His Ala
      20             25

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